Studies of Soft X-ray Excited Luminescence in Doped Nanocrystals *	U15

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Soft x-rays in the energy range of 200-1200 eV were used to investigate the microscopic structure and physical properties of various doped nanocrystal (DNC) materials including phosphors of practical interest such as Y2O3:Tb, Gd2O3:Tb and ZnS:Mn with particle size distribution in the range of 15-50 . The visible x-ray excited luminescence (XEL) output was recorded as a function of incident x-ray photon energy. By analyzing the variation of XEL around the K absorption edge of a constituent element in the system such as O, we can obtain useful information about the efficiency of x-ray-to-visible down-conversion channels involved with that specific element. This technique is useful for probing the changes in the conditions of quantum confinement in the DNC systems with different size distribution. Also, from a basic physics point of view, the excited nanoparticles can sustain collective modes which are dependent on the size of the particles and the boundary conditions. In the DNC samples with uniform particle size distribution, geometrical resonances are expected to take place which can be utilized to optimize the XEL output as well as other physical properties, thus provide an effective method to determine particle-size distribution and also lead to some possible technical applications.

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